REMARKS

INTRODUCTION:

In accordance with the foregoing, the title has been amended to improve form, claims 3-12, 18, 20, 22, 25, 26, 28, 29, and 32-36 have been canceled without prejudice or disclaimer in response to the Examiner's making final the restriction requirement imposed in the Office Action of September 12, 2000, claims 17, 21, and 27 have been amended to clarify the invention and not for the purposes of adding a narrowing limitation to the claim, and claims 37-47 have been added.

No new matter is being presented, and approval and entry of the foregoing amendments and new claims are respectfully requested.

Claims 1, 2, 13-17, 19, 21, 23, 24, 27, 31, and 37-47 are pending and under consideration. Reconsideration is requested.

REQUEST FOR RECONSIDERATION OF FINAL RESTRICTION REQUIREMENT

On page 2 of the Office Action, the Examiner made final the Restriction Requirement as to claims 14-16. However, on page 6 of the Office Action, the Examiner allowed claim 13. Since claims 14-16 depend from independent claim 13, claims 14-16 are fully embraced by the allowed independent claim 13. As such, it is respectfully requested that, as per MPEP 809.02(c) and 37 CFR 1.141, depending claims 14-16 no longer be withdrawn from consideration due at least to their embracing the limitations of independent claim 13.

OBJECTION TO THE TITLE:

In the Office Action at page 3, the Examiner objects to the title as not being descriptive. In view of the proposed amended title set forth above, the outstanding objection to the title should be resolved.

REJECTION UNDER 35 U.S.C. §112:

In the Office Action at page 3, the Examiner rejects claims 1, 2, 17, 19, 21, 23, 24, 27, and 30 under 35 U.S.C. §112, second paragraph, as being indefinite since it is unclear as to what the recited "spinning process" in claims 1, 17, and 27 means. This rejection is respectfully traversed and reconsideration is requested.

By way of review, claim 1 recites "forming a nozzle part by a spinning process." In the embodiment of the present invention disclosed on page 8, lines 3-12 of the specification in reference to FIGs. 6A and 6B, a silicon wafer 135 is attached to a reinforcing ring 136. The nozzle plate 132 is formed on top of the silicon wafer 135. The nozzle plate 132 is not made of silicon, but is instead made of polyimide. In order to obtain a desired thickness, the polyimide is formed on the silicon wafer 135 using a spinning process, which uses centrifugal force to create an even, thin layer of the polyimide in order to form the nozzle plate 132. This sort of spinning process is known to one of ordinary skill in the art.

As further evidence that one of ordinary skill in the art would understand what a "spinning process" entails, the Examiner's attention is directed to col. 4, lines 56-59, of Leban (U.S. Patent No. 5,229,785), which discusses using a spinning process to form a coating.

As such, it is respectfully submitted that the recited limitation of "forming a nozzle part by a spinning process" as recited in claim 1, and similarly recited in claims 17 and 27, would be understood by one of ordinary skill in the art, and that claims 1, 17, and 27 are deemed patentable due at least to their being compliant with 35 U.S.C. §112, paragraph 2.

Dependant claims 2, 19, 21, 23, 24, and 30 are deemed patentable due at least to their depending from respective independent claims 1, 17, and 27.

REJECTION UNDER 35 U.S.C. §102:

In the Office Action at page 3, the Examiner rejects claims 1, 2, and 31 under 35 U.S.C. §102(a) in view of prior art disclosed in the Background of the Invention disclosed on pages 1-5 and FIGs. 1 and 2. This rejection is respectfully traversed and reconsideration is requested.

In the Office Action, the Examiner notes that the prior art discloses "adhering a membrane 20 to the nozzle part and a heat driving part 10 thereby forming a fluid jetting apparatus." As a point of clarification, claim 1 recites "adhering a membrane to the nozzle part and a heat driving part to position the heat driving part, the membrane and the nozzle part *in order to form the fluid jetting apparatuses* in the shape of a wafer." As such, claim 1 recites that numerous fluid jetting apparatuses are formed in the shape of a wafer.

By way of review, the admitted prior art shown in FIGs. 1 and 2 discloses a process by which individual fluid jetting apparatuses are formed. In order to form the nozzle part 30, nozzle plates 32 move past the treating apparatus 53, where the nozzle 54 is formed on the nozzle plates

32 individually. The nozzle plates 32 are rolled up on the feeding reel 51 prior to forming of the nozzle 34, and rolled up on the takeup reel 52 after forming the nozzle 34. During the forming of the nozzle 34, the nozzle plate 32 is moved laterally between the reels 51 and 52 as seen in FIG. 2. There is no disclosure that the nozzle plate 32 itself is formed by rolling the nozzle plates 32 on the reels 51, 52. This conclusion is reinforced by the statement on page 3, lines 4-8, which states that the "completed apparatus is wound to be preserved in the take-up reel 52." As such, the admitted prior art discloses forming the nozzle part using a lateral motion on an existing nozzle plate, and then transporting the nozzle part by rolling the nozzle part in reels to preserve the completed apparatus.

In addition, the admitted prior art discloses a process by which the fluid jetting apparatus is formed individually. As shown in FIG. 1, the membrane 20, the heat driving part 10, and the nozzle part are combined to form a single fluid jetting apparatus on substrate 11. There is no disclosure that the membrane 20 is adhered to the heat driving part 10 and the nozzle part 30 to form multiple fluid jetting apparatuses in the shape of a wafer since these elements are disclosed as only forming a single fluid jetting apparatus per substrate 11.

In contrast, claim 1 recites that multiple fluid jetting apparatuses are made by forming nozzle parts by a spinning process, and that the nozzle part, the membrane, and the heat driving part are combined to form multiple fluid jetting apparatuses in the shape of a wafer. As such, it is respectfully submitted that, contrary to the assertions of the Examiner, it is respectfully submitted that the admitted prior art in the Background of the Invention section of the specification does not disclose "forming a nozzle part by a spinning process, " and "then

adhering a membrane to the nozzle part and a heat driving part to position the heat driving part, the membrane and the nozzle part in order to *form the fluid jetting apparatuses in the shape of a wafer*" as recited in claim 1.

Claim 31 is similarly deemed patentable due at least to the admitted prior art in the Background of the Invention section of the specification not disclosing "adhering the membrane to a heat driving part, *to form the fluid jetting apparatuses* as a wafer type" as recited in claim 31.

Claim 2 is deemed patentable due at least to its depending from independent claim 1.

REJECTION UNDER 35 U.S.C. §103:

In the Office Action at pages 4-5, the Examiner rejects claims 17 and 19 under 35 U.S.C. §102(b) in view of Leban (U.S. Patent No. 5,229,785), or in the alternative, under 35 U.S.C. §103 in view of Leban and it being old and notoriously well known in the art of electrical manufacturing to form wafer material of silicon. The rejection is respectfully traversed and reconsideration is requested.

By way of review, FIGs. 1A-1G of Leban disclose a method of forming a print engine on a substrate 10. The print engine includes a heater resistor element 36, a firing chamber 32, and an orifice plate opening 20 as shown in FIG. 1G. While each print engine is disclosed as possibly having multiple heat resister elements 36, firing chambers 32, and orifice plate openings 20, there is no disclosure that multiple print engines are formed using the same substrate 10, or that multiple print engines are formed by adhering an orifice plate layer 14, a polymer layer 22, and a thin-film resistor substrate 34. Col. 6, lines 1-9. Instead, the invention is drawn to a

conventional manufacturing method whereby single print engines are formed individually using individual substrates. Col. 2, lines 44-53.

In contrast, claim 17 recites a method of forming multiple fluid jetting apparatuses, where a nozzle part is formed on a substrate, the nozzle is adhered to a membrane, and the membrane is adhered to a heat driving part to form the fluid jetting apparatuses. As such, it is respectfully submitted that, contrary to the assertion of the Examiner, Leban does not disclose a "process of manufacturing a plurality of fluid jetting apparatuses at once, comprising ...adhering the membrane to a heat driving part to form the fluid jetting apparatuses" as recited in claim 17.

While it is believed that the claim had previously recited this limitation, in order to clarify this result, claim 17 has been amended to recite "adhering the membrane to a heat driving part to form the fluid jetting apparatuses." Claim 17 has not been amended to narrow the scope of the claim.

Further, even assuming arguendo that it is old and notoriously well known in the art of electrical manufacturing to form wafer material of silicon, this assumed fact does not cure the above noted defect of Leban with respect to claim 17. As such, it is respectfully submitted that the combination of Leban and it being old and notoriously well known in the art of electrical manufacturing to form wafer material of silicon does not disclose or suggest the method recited in claim 17.

Claims 19 is deemed patentable due at least to its depending from independent claim 17.

In the Office Action at pages 5-6, the Examiner rejects claims 17, 23, 27, and 30 under 35 U.S.C. §103 in view of Leban and Pan (U.S. Patent No. 4,894,664). The rejection is

respectfully traversed and reconsideration is requested.

By way of review, Pan discloses forming an ink jet printhead 20 having a cantilever beam 12, a heating element in the form of a resistor layer 15, and a nozzle 19. Col. 2, lines 57-68; FIG. 3. The beam 12 is formed using nickel layer 40, and the nozzle element 19 is formed on an individual slab 56. These layers are adhered to form the single printhead 20 shown in FIG. 3. Col. 3, lines 17-19, and 64-68 through col. 4, lines 1-9; FIGs. 8A-8C. As such, Pan discloses forming individual printheads 20, but does not disclose forming multiple ink jet printheads 20 by adhering a nickel layer 40, a resistor layer 15, and a nozzle 19.

In contrast, as noted above in the discussion on claim 17 in regard to Leban, claim 17 recites a method of forming multiple fluid jetting apparatuses, where a nozzle part is formed on a substrate, the nozzle is adhered to a membrane, and the membrane is adhered to a heat driving part to form the fluid jetting apparatuses. Further, since Leban is not relied upon as disclosing and does not disclose forming fluid jetting apparatuses, it is respectfully submitted that, contrary to the assertion of the Examiner, the combination of Pan and Leban does not disclose or suggest a "process of manufacturing a plurality of fluid jetting apparatuses at once, comprising ... adhering the membrane to a heat driving part to form the fluid jetting apparatuses" as recited in claim 17.

Similarly, it is respectfully submitted that, contrary to the assertion of the Examiner, the combination of Pan and Leban does not disclose or suggest a "process of manufacturing a plurality of fluid jetting apparatuses, comprising ... adhering the nozzle part to the membrane,

and the membrane to the heat driving part to form the fluid jetting apparatuses" as recited in claim 27.

It is believed that the claim had previously recited this limitation. However, in order to clarify the invention, claim 27 has been amended to recite "adhering the nozzle part to the membrane, and the membrane to the heat driving part to form the fluid jetting apparatuses." Claim 27 has not been amended to narrow the scope of the claim.

Dependent claims 23, and 30 are deemed patentable due at least to their depending from respective independent claims 17 and 27.

STATUS OF CLAIMS HAVING PATENTABLE SUBJECT MATTER

On page 6 of the Office Action, the Examiner allows claim 13. Claims 14-16 are deemed patentable due at least to their depending from and fully embracing independent claim 13.

Further, the Examiner states that claims 21 and 24 contain patentable subject matter. Claim 21 has been made independent and has not been amended to narrow the scope of the claim.

PATENTABILITY OF NEW CLAIMS

Claim 45 recites a method of forming fluid jetting apparatuses by adhering a nozzle part having nozzles to a membrane, and adhering the membrane to a heat driving part to form fluid jetting apparatuses, where each fluid jetting apparatus has one of the nozzles. As discussed above in more detail, the cited prior art discloses techniques of building fluid jetting apparatuses

individually, but do not disclose forming multiple fluid jetting apparatuses by adhering a nozzle part, a membrane, and a heat driving part. As such, it is respectfully submitted that claim 45 is deemed patentable due at least to the cited prior art not disclosing or suggesting "adhering a nozzle part having nozzles to a membrane," and "adhering the membrane to a heat driving part to form fluid jetting apparatuses, each fluid jetting apparatus having one of the nozzles" as recited in claim 45.

Claims 37-44, 46, and 47 are deemed patentable due at least to their depending from respective independent claims 1, 17, 27, 31, and 45.

ATTACHMENT

Attached hereto is a "Version With Markings to Show Changes Made," comprising a marked-up version of changes made to the Claims by the current amendment.

CONCLUSION:

In accordance with the foregoing, it is respectfully submitted that all outstanding objections and rejections have been overcome and/or rendered moot. And further, it is respectfully submitted that all pending claims patentably distinguish over the prior art. Thus, there being no further outstanding objections or rejections, the application is submitted as being in condition for allowance which action is earnestly solicited.

If the Examiner has any remaining issues to be addressed, it is believed that prosecution can be expedited by the Examiner contacting the undersigned attorney for a telephone interview to discuss resolution of such issues.

If there are any additional fees associated with the filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

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VERSION WITH MARKING TO SHOW CHANGES MADE

IN THE CLAIMS

Please **CANCEL** claims 3-12, 18, 20, 22, 25, 26, 28, 29, and 32-36; **AMEND** claims 17, 21, and 27; and **ADD** new claims 37-47, as follows. The remaining claims are reprinted, as a convenience to the Examiner, as they presently stand before the U.S. Patent and Trademark Office.

1. (NOT AMENDED) A process of manufacturing a plurality of fluid jetting apparatuses at once, comprising:

forming a nozzle part by a spinning process; and

then adhering a membrane to the nozzle part and a heat driving part to position the heat driving part, the membrane and the nozzle part in order to form the fluid jetting apparatuses in the shape of a wafer.

2. (NOT AMENDED) The process of manufacturing a plurality of fluid jetting apparatuses as claimed in claim 1, further comprising:

forming electrodes and heating elements on a first substrate of wafer;

forming driving fluid barriers on the electrodes and the heating elements; and

forming driving fluid chambers in the driving fluid barriers, to form the heat driving part.

3-12 (CANCELED)

13. (NOT AMENDED) A process of manufacturing a plurality of fluid jetting apparatuses, comprising:

forming electrodes and heat elements on a first substrate of silicon wafer, forming driving fluid barriers on the electrodes and heat elements, and driving fluid chambers in the driving fluid barriers, to form a heat driving part;

forming a polyimide coating layer on a second substrate of silicon wafer, forming an adhesive polyimide coating layer on the polyimide coating layer, attaching a first reinforcing ring to the adhesive polyimide coating layer, and separating the polyimide coating layer from the second substrate after attaching the first reinforcing ring on the adhesive polyimide coating layer, to form a membrane;

attaching a second reinforcing ring beneath a third substrate of silicon wafer by the spinning process, forming a nozzle plate on an opposite side of the third substrate from that of the second reinforcing ring, forming jetting fluid barriers on the nozzle plate, forming jetting fluid chambers in the jetting fluid barriers, and forming nozzles in the nozzle part;

adhering the polyimide coating layer of the membrane to the jetting fluid barriers, and separating the second reinforcing ring and the third substrate of silicon wafer, from the nozzle plate; and

adhering the adhesive polyimide coating layer of the membrane to the driving fluid barriers of the heat driving part.

14. (NOT AMENDED) The process of manufacturing a plurality of fluid jetting apparatuses as claimed in claim 13, wherein the forming of the polyimide coating layer on the second substrate and the forming of the adhesive polyimide coating layer on the polyimide coating layer are accomplished by the spinning process.

15. (NOT AMENDED) The process of manufacturing a plurality of fluid jetting apparatuses as claimed in claim 13, wherein the forming of the nozzles in the nozzle plate is accomplished by using a laser beam from a treating apparatus.

16. (NOT AMENDED) The process of manufacturing a plurality of fluid jetting apparatuses as claimed in claim 13, wherein the forming of the nozzles in the nozzle plate is accomplished by a process of reactive ion etching.

17. (ONCE AMENDED) A process of manufacturing a plurality of fluid jetting apparatuses at once, comprising:

forming a nozzle part on a silicon wafer by a spinning process;

adhering the nozzle part with the silicon wafer to a membrane;

removing the silicon wafer from the nozzle part; and

adhering the membrane to a heat driving part to form the fluid jetting apparatuses.

18. (CANCELED)

19. (NOT AMENDED) The process of manufacturing a plurality of fluid jetting apparatuses as claimed in claim 17, wherein the forming of the nozzle part comprises:

forming a nozzle plate on a first substrate by the spinning process;

forming jetting fluid barriers on the nozzle plate by the spinning process;

forming a first reinforcing element on the first substrate;

forming jetting fluid chambers in the jetting fluid barriers; and

forming nozzles in the nozzle plate.

20. (CANCELED)

21. (ONCE AMENDED) [The process of manufacturing a plurality of fluid jetting apparatuses as claimed in claim 19, further comprising:] A process of manufacturing a plurality of fluid jetting apparatuses at once, comprising:

forming a nozzle part on silicon wafer by a spinning process, the forming the nozzle part comprising:

forming jetting fluid barriers on the nozzle plate by the spinning process;

forming a first reinforcing element on the first substrate;

forming jetting fluid chambers in the jetting fluid barriers; and

forming nozzles in the nozzle plate;

forming [the] a membrane, the forming the membrane comprising

forming a polyimide coating layer on a second substrate of silicon wafer;

forming an adhesive polyimide coating layer on the polyimide coating layer;

forming a second reinforcing element on the adhesive polyimide coating layer; and

separating the polyimide coating layer from the second substrate after forming the second reinforcing element on the adhesive polyimide coating layer;

adhering the nozzle part with the silicon wafer to the membrane;

removing the silicon wafer from the nozzle part; and

adhering the membrane to a heat driving part.

22. (CANCELED)

23. (NOT AMENDED) The process of manufacturing a plurality of fluid jetting apparatuses as claimed in claim 17,

forming the heat driving part, comprising

forming electrodes and heat elements on a substrate of silicon wafer;

forming driving fluid barriers on the electrodes and the heat driving elements; and

forming driving fluid chambers in the driving fluid barriers.

24. (NOT AMENDED) The process of manufacturing a plurality of fluid jetting apparatuses as claimed in claim 21,

forming the heat driving part, comprising

forming electrodes and heat elements on a third substrate of silicon wafer;

forming driving fluid barriers on the electrodes and the heat driving elements; and

forming driving fluid chambers in the driving fluid barriers.

25-26. (CANCELED)

27. (ONCE AMENDED) A process of manufacturing a plurality of fluid jetting apparatuses, comprising:

forming a nozzle part on a first substrate of silicon wafer by a spinning process;

forming a membrane on a second substrate of silicon wafer by the spinning process;

forming a heat driving part by forming electrodes and heat elements on a third substrate of silicon wafer; and

adhering the nozzle part to the membrane, and the membrane to the heat driving part <u>to form the fluid jetting apparatuses</u>.

28-29. (CANCELED)

30. (NOT AMENDED) The process of manufacturing a plurality of fluid jetting apparatuses as claimed in claim 27, wherein:

the forming of the electrodes on the third substrate is performed by an lithography process or a wet etching process; and

the forming of the heat elements on the third substrate is performed by the lithography process, the spinning process or a lift-off process.

31. (NOT AMENDED) A process of manufacturing a plurality of fluid jetting apparatuses, comprising:

adhering a nozzle part to a membrane as a wafer type; and

adhering the membrane to a heat driving part, to form the fluid jetting apparatuses as a wafer type.

32-36 (CANCELED).

37. (NEW) The process of claim 1, wherein said forming the nozzle part comprises:

spinning a raw material on a substrate to form the nozzle part; and

forming nozzles in the nozzle part such that each fluid jetting apparatus includes a formed nozzle.

38. (NEW) The process of claim 1, further comprising splitting the fluid jetting apparatus in the form of the wafer into separate fluid jetting apparatuses.

39. (NEW) The process of claim 17, wherein said forming the nozzle part comprises:

spinning a raw material on the silicon wafer to form the nozzle part; and

forming nozzles in the nozzle part such that each fluid jetting apparatus includes a formed nozzle.

40. (NEW) The process of claim 17, further comprising splitting the adhered nozzle part, membrane, and heat driving part into separate fluid jetting apparatuses.

41 (NEW) The process of claim 27, wherein said forming the nozzle part comprises:

spinning a raw material on the first substrate of the silicon wafer to form the nozzle part; and

forming nozzles in the nozzle part such that each fluid jetting apparatus includes a formed nozzle.

42. (NEW) The process of claim 27, further comprising splitting the adhered nozzle part, membrane, and heat driving part into separate fluid jetting apparatuses.

43. (NEW) The process of claim 31, further comprising forming the nozzle part, said forming the nozzle part comprising:

forming the nozzle part on a substrate; and

forming nozzles in the nozzle part such that each fluid jetting apparatus includes a formed nozzle.

44. (NEW) The process of claim 31, further comprising splitting the wafer type fluid jetting apparatus into separate fluid jetting apparatuses.

45. (NEW) A process of forming fluid jetting apparatuses, comprising:

adhering a nozzle part having nozzles to a membrane; and

adhering the membrane to a heat driving part to form fluid jetting apparatuses, each fluid jetting apparatus having one of the nozzles.

46. (NEW) The process of claim 45, further comprising

forming the nozzle part on a substrate; and

forming the nozzles in the formed nozzle part.

47. (NEW) The process of claim 45, further comprising splitting the adhered membrane, nozzle part, and heat driving part into separate fluid jetting apparatuses.